SUMMARY

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### SUMMARY

The subjects for the present study were selected from the out patient department, from the ante-natal wards and from the labour room of the department of Obstetrics and Gynaecology, M.L.B. Medical College, Jhansi, were studied for their total serum cholesterol levels, starting from May 1984 to April 1985.

The patients studied were broadly divided into

Group I - Comprised of normal pregnancy,

Group II - Toxaemia of pregnancy,

Later to the

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- (i) Pre-eclampsia,
- (ii) Eclampsia.

Out of the 46 patients studied, 24 were of normal pregnancy, 14 of pre-eclamptic toxaemia and 8 of eclampsia.

The total serum cholesterol levels were ascertained during the ante-natal period, labour and post natal periods of normal pregnancy and pre-eclampsia. While during eclampsia only the subjects during labour and post natal periods could be studied.

In normal pregnancy the cholesterol levels showed a rising trend during ante partum period which fell during the post partum period, but the results were statistically insignificant. The levels of cholesterol in relation to parity showed no significance statistically, while the levels when related to the high fatty diet intake and the socio-economic status were significant statistically, while the relation with the lactation status showed a high significance during the later post partum period.

as in normal pregnancy rose during the ante-natal period and fell during the post natal period, but statistically the results were insignificant. The levels of the cholesterol when related with the socio-sconomic status and parity were found to be statistically insignificant, while the relation of the levels with a high fatty diet intake were statistically significant and the relation of the levels with the lactation status were significant only during the later stages of the post partum period.

In eclamptic subjects the levels of cholesterol were decreased during the post partum

period as when compared during labour, though the levels were statistically insignificant. The levels when related with parity had no significance statistically. While the levels when related with the socio-economic status, high fatty diet intake were highly significant statistically, and also the relation of the levels with lactation both during early and late post partum periods were significant statistically.

In the levels of cholesterol when compared during the ante-natal period in conditions of normal pregnancy and pre-eclampsia, observed to be higher during pre-eclampsia while the levels when compared in the three conditions of normal prognancy, pre-eclampsia and eclampsia, the results were observed to be higher in pre-eclampsia as compared to normal prognancy, and lower in eclampsia.

\*\*\*\*\*\*

## STUDY OF ANTE-PARTUM AND POST-PARTUM SERUM TOTAL CHOLESTEROL LEVEL IN NORMAL PREGNANCY AND TOXAEMIA OF PREGNANCY

### THESIS

FOR.

### MASTER OF SURGERY

**OBSTETRICS AND GYNAECOLOGY** 



BUNDELKHAND UNIVERSITY
JHANSI.

This is to certify that the work entitled "Study of ente-partum and post-partum serum total cholesterol level in normal pregnancy and toxaemia of pregnancy", which is being submitted as a thesis for M.S. (Obstetrics and Gynaecology) by Dr. Indu, has been carried out under my direct supervision and guidance in the department of Obstetrics and Gynaecology, M.L.B. Medical College, Jhansi.

She has put in the necessary stay in the department as per University regulations.

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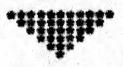
Last but not the least I am grateful to my husband Dr. S. Kumar, for affording me all opportunities and cultivating the necessary background for undertaking this work.

Indu.

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### CONTRNTS

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### INTRODUCTION

#### INTRODUCTION

It has been seen in various epidemiological studies that in hypertension there occurs hypercholesterolaemia. It is to be studied whether or not there is correlation between pre-eclamptic and eclamptic toxaemia - pregnancy induced hypertension state, and hypercholesterolaemia ?

pregnancy is a physiological state when significant circulatory changes and changes partaining to metabolic process occur which have as effect on blood pressure. These changes are due to presence of placental hormones. In toxaemia of pregnancy which is manifested by several features (e.g. hypertension and affected renal function) metabolic changes are exaggerated (Lall & Sinha, 1983).

As the prognancy advances, the concentration of many steroids increases. Since cholesterol is the scurce of most of the steroids found in increased emount in circulation of sormal pregnant women, the cholesterol level continues to rise till term.

Several investigators have observed increased sorum cholesterol during prognancy which progresses towards

term and decreases after delivery (Boyd, 1934; Dieckmann and Wegner, 1934; Boyd and Kingston, 1936; Schwars et al. 1940; Peters et al. 1951; Russ et al. 1954; Oliver and Boyd, 1955; Ven Studnitz, 1955; Watson, 1955; Jacina et al. 1961).

According to Watson (1957), the level of total serum cholesterol increased progressively from the twentyninth week of gestation and it remained elevated through perturition and early puerperium.

chosh in 1953 reported that the value of total cholesterol rises significantly in pre-eclamptic patients. Scandrett (1959), studied that there was not much change in the cholesterol levels in severe pre-eclamptic and in the normal gravida. Brat Vold and De Alvores (1961), noted some increase of serum cholesterol in pre-eclampsia as compared with values in normal pregnancy. The difference, however, was not thought to be significant. On the contrary, Arsoba and Kretowics (1963), reported that such difference was statistically significant.

The serum cholesterol lavel falls gradually in the post partum period in normal and tomsemia of prognancy. However, in tersemic cases such lavels in the post partum period do not return to normal

level as quickly as it does in the cases of normal pregnancy (Lall & Sinha, 1983).

Herrmann and Neumann (1912), observed that
the blood cholesterol and total lipids decreased during
normal lactation but remained elevated when lactation
did not occur. Granizer (1950), studied that there
is a decrease in the plasma cholesterol after delivery.
The possibility is presented that this decrease in
cholesterol reflects the adrenocorticotrophic (ACTH)
activity in post partum plasma.

In view of the above it is desirable to study the level of serum cholesterol during pregnancy and puerperium in normal cases vis-a-vis those associated with toxaemia in order to find out whether there is any correlation between the level of serum cholesterol and degree of toxaemia. We further wish to observe if there is any change in cholesterol level after the withdrawal of placental hormones in post partum period and after puerperium.

No doubt in the developed countries, exhaustive studies have been undertaken in this regard, very little work has been done in the developing country like India. To say the least, so work has been done in Bundelkhand region. It is evident that there is colored difference in spain-economic status.

literacy level and food habits of people living in the developed countries and those in the developing countries. As these factors are of paramount importance and have a great bearing on the subject, it is felt that the results observed in the developed countries may not be applicable to the populace in the countries like ours. It is, therefore, necessary to undertake such study keeping in view the above factors.

\*\*\*\*\*\*

# REVIEW OF LITERATURE

#### REVIEW OF LITERATURE

normal pregnancy was known as early as 1845
(Becquerel and Rodier). Two years later, Virchow
(1847) showed that the milky appearance of the sera
of pregnant women was due to the presence of fat as
demonstrated by shaking the sera with ether, so that
the fat could be extracted. The first chemical
study was undertaken in 1911 when Chaufford and
associates demonstrated an increase of blood
cholesterol during normal pregnancy and also in
toxaemia of pregnancy. In the same year Neumann
and Herrmann studied the lipid particles in whole
blood and reported increase in cholesterol during
pregnancy.

Dischment investigators like Boyd (1934);
Dischmens and Wegner (1934); Schwarz et al (1940);
Peters et al (1951); Russ et al (1954); Oliver and
Boyd (1955); Von Studnitz (1955); Vatson (1955);
Jacine et al (1961) observed in their works that
there was an increase in serum cholesterol which
progressed towards term and decreased after delivery.

CONTRACTOR AND A STREET

Different investigators have reported increased serum cholesterol level at different periods of gestation and puerperium. Herrmann and Neumann (1912) analysed the serum of pregnant women in various months of gestation, thirteen of these were under 7 months. He concluded that during the first 6-7 months, the serum cholesterol might be increased, and that during the last 2 months (thirty-two cases) an increase in serum cholesterol was the rule. Plass and Tempkins (1923) also have given figures for the blood and lipids particularly cholesterol during pregnancy. These figures indicate a gradual rise from the 4th month to term.

Tyler and Underhill (1925) determined whole blood cholesterol in normal and in pregnant women. They studied gravid women in each month of pregnancy, beginning with the third and reported that cholesterol and ester cholesterol increases gradually until term, at that time it was roughly one third higher than that at three months.

Gardner and Gainsborough (1929) reported
that free cholesterol increased during pregnancy to
the thirtieth week with a decrease in ester cholesterol
to about the same time. In their series, there occurs
then, a reversal of the curve so that at parturition

approximately a normal relationship exists again.

Kaufmann and Miihlbock (1933) did not notice these fluctuations but they reported little variations from the second month of gestation to term. Bugnard, Colmbics and Guilheim, Hinglais and Coverts (1940) found an increase in total cholesterol in later months of pregnancy.

Oliver and Boyd (1955) after careful study of 12 normal primi-gravida stated that between 31st and 33rd weeks of pregnancy, there was a highly significant rise in the plasma ester and total cholesterol. By the 20th post partum week these values had decreased considerably but were all higher than the levels at the 12th week of pregnancy.

Disckmann and Wegner (1934) found the total cholesterol to increase to 23 per cent above the first trimester level and which decreased to 27 per cent at the eigth post partum week from the values noted at term. This rise noted by Disckmann is considerably lower than De Alvarez et al (1959) findings of 54 per cent increase in third trimester values above the first trimester values for total cholesterol and a 23 per cent decrease in the values 6 to 7 weeks post partum for total cholesterol as compared to the third trimester values.

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Mc Eachern and Gilmour determined whole blood cholesterol in twelve pregnant women and concluded that a marked elevation was found in about 30 per cent of normal pregnant women, beginning about the sixth week prior to delivery and that about 80 per cent had a level above normal on the first day after delivery. The figures were still high on the 12th post partum day.

It is reported that there is no constant variation in serum cholesterol levels in toxasmia of pregnancy from those in healthy gravida (Slemons et al, 1917; Slemons and Stander, 1923; Disckmann and Wegner, 1932, 1933). Boyd and Rochester (1935) found that concentration of the plasma lipids varied greatly in eclamptic patients but no significant variation occurred in the values of any single lipid. According to De Alvarez (1961) there was some increase of serum cholesterol in pre-eclampsia as compared with values in normal pregnancy. The difference, however was not thought to be significant. Konttinen and Pyorala (1964) studied serum lipids in late pregnancy, at delivery and during early puerperium in mothers with normal pregnancy and mothers with pre-eclaspsia. Levels which were numerically higher but not statistically significant were seen in pre-eclamptic as compared to normal mothers, except at delivery, when a statistically higher level was seen in total cholesterol.

Melson et al (1966) observed an elevation of total cholesterol in toxaemia of pregnancy. According to Pontis and Purandare (1972), Hytten and Lind (1973), there is an increase in circulating lipids in conditions of normal and in toxaemia of pregnancy. This increase is a gradual one and remarkable in the third trimester. In 1978 Chaturvedi, Tandon, Singh observed that in toxaemia of pregnancy, there was significant rise in the total serum cholesterol as compared to the third trimester of normal gravidas.

### 1. Endocrinal changes in normal pregnancy and toxaemia of pregnancy

An increase in the various hormones during gestation and their influence on blood lipids is well established.

(1) <u>Estrogen</u> - According to Oliver and Boyd (1955), large physiological increase in circulating destrogen are associated with changes in blood lipids of a type found in atherosclerosis, while administered estrogens can reverse such lipid changes. Estrogen when administered causes a fall in serum lipids and its partitions with a rise in alpha-lipoproteins (Adleraberg, 1957). Eilert (1949) found that estrogen administered to women evoked an increase in the plasma

total lipids. Similar findings have been observed by various workers on administration of oral contraceptives.

Most plasma lipids and lipoproteins usually increased in women who used contraceptives that contain estrogen and progestin (Devi and Sharma, 1972; Gupta et al, 1976). Wallace et al (1979) observed that total cholesterol, triglycerides, low density lipoproteins and very low density lipoproteins all have been elevated in women who used oral contraceptives. Rasdan, Skarma, Sharma, Agarwal, Singh (1981) found statistically significant increase in mean serum cholesterol level after 6 and 9 months of using oral contraceptives. Aurell et al (1966) and Johnson & Lee (1973) also reported increase in serum cholesterol level after the use of oral contraceptives.

Auss and associates (1955) found that the administration of estrogen lowered the beta-lipoproteins but raised the alpha lipoproteins.

Purman and co-workers (1958) found an increase in alpha lipoproteins following the administration of estrogen but noted a rather inconstant response of beta lipoproteins. It seems that the consensus supports the contention that estrogen increases the alpha lipoproteins fraction whereas the findings during pregnancy (De Alvares et al. 1959) tend to

confirm an increase in beta lipoproteins, in addition to the changes already noted.

There is a correlation between the sex hormones and cholesterol levels. The female sex hormone i.e. estrogen decreases it, whereas the male sex hormone increases it (Gayton). This is evidenced by the fact that the higher cholesterol in the male is associated with a high incidence of atherosclerosis. But the exact mechanism by which estrogen lowers the cholesterol level is not known.

In severe pre-eclampaia, production of estriol and progesterone is reduced. According to Pratibha Vaidya et al (1978), the urinary estrogen levels were essentially normal in mild to moderate toxaamia, but the levels were below normal in severe toxaamia. Depending upon the findings in normal prognancy, it can be said from the above observations that there existed a correlation between low estrogen levels in severe eclampsia with hypercholesterolaemia.

### (ii) Chorionic gonadotrophins -

gonedotrophins are increased in serum and wrine in pre-eclamptic tomacmie; that the blood estrin and urine pregnandial are diminished and that this

imbalance between estrin, pregnondial and prolan may be an important factor in determining the onset of toxaemia.

### (iii) Thyroid Hormone -

Extensive studies have been carried out to determine the exact role of the thyroid in lipid metabolism during pregnancy. The results of these investigations do not offer absolute conclusions. Numerous workers have shown that the protein-bound icdine and serum precipitate icdine are elevated as early as second month of pregnancy (Peters, Heinemann, 1948; Lister, Ashe, 1955; Russell, 1956). These levels have been found to reach values as high as those seen in individuals with overt hyper-thyroidism (Russell, 1956). Pregnancy seems at least in some cases, however, partially to eclipse symptoms of hyperthyroidism. Thus although thyroid hormone has been found to depress all the serum lipid partitions (Strisower, B. et al. 1954; Strisower, E.H. et al. 1958) it does seem that during pregnancy, the tissue becomes more refractory to the effect of thyroxin. Patterson, Hunt and Nicodemus (1938) believe that hypercholesterolaemia of pregnancy is due to subclinical hypothyroidism.

an important factor in certain types of toxaemia.

Nicholson (1904) and Kustner (1933) stated that
with hyperthyroidism or with enlarged thyroid gland,
toxaemia rarely develops. Hoffmann and Anselmino
(1930) found that amount of thyroid secretion in
blood was enormously increased in eclampsia. Colvin
and Bartholomew (1939) believed that pregnant patients
with subnormal basal metabolic rate had a hypercholesterolaemia and were increasingly subjected to
toxaemia, and the basal rate decreased.

### (iv) Cortisone -

The adrenal cortex has long been thought to influence plasma lipid levels. According to Jailer (1957), cortisone increases the cholesterol and its ester level and this is achieved at the cost of neutral fats. Adlersberg and Eschaffer (1955) showed that the administration of cortisone produces an increase in total serum cholesterol and phospholipids but tends to effect a reduction in neutral fat. Genzell (1953) reported a fourfold increase in plasma 17-hydroxy corticosteroid during normal pregnancy and other studies have substantiated increased adreno-cortical activity in pregnancy. Just how many of the changes in serum lipids in pregnancy are due to the

adrenal cortex, is still debatable and must await further study.

### (w) Role of pituitary gland -

Seifter and Beader in 1957 studied that somatotrophic hormone of the anterior pituitary raises the blood level and lipid mobilizer hormone of the posterior pituitary aids the process of lipogenesis by mobilizing the depot fat. According to De Alvarez (1959), the hypertrophy of the anterior pituitary glands during normal pregnancy is well known. That the cells are actively secreting is concurred in as well (Aschner, 1912). Hyperlipemia and hypercholesterolasmia frequently accompany acromegaly. Such an increase in these lipids might, however, more probably be related to diabetics or to other disorders frequently accompanying anterior pituitary hyperfunction rather than to pituitary changes alone (Peters, Van Slyke, 1946). The nature of the secretions of "pregnancy cells" is as yet unknown but it is quite possible that they could well differ from the secretions of the normal pituitary in the nonpregnant individual. Thus any direct effect of the pituitary on lipid metabolism during normal pregnancy must remain conjecturals

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## 2. Metabolic changes in normal pregnancy and toxaemia of pregnancy

It is know fact that 73% of healthy women, during pregnancy, excrete lactose and glucose. These sugars in the urine of pregnant women were lactose alone 51%, glucose alone 25% and lactose and glucose 16% (Flynn, Harper and De Mayo, 1953).

It is evident that lactose is formed during pregnancy. Lactose is made up of two monosacharide molecules, one is glucose and the other is galactose. Thus for the formation of a lactose molecule galactose must be present in the body or the lactose is to be supplied by way of diet. For the provision of galactose either it should be supplied by diet or it must be synthesised from glucose.

Papur and Tipton (1957) demonstrated the conversion of glucose-1-phosphate to galactose-1 phosphate by labelled C<sub>14</sub> stom in guines pigs. The galactose-1-phosphate formed is incorporated into lactose by mammary glands, Lactose, absorbed in the blood from the mammary glands, is not metabolized due to the absence of the ensyme lactose.

Wells and Anderson (1962) studied the distary effect of lectoss on the serum cholesterol level in human subjects and concluded that dist with

high contents of lactose when fed to men for 5 weeks, the average serum cholesterol level increases. After 5 weeks when lactose in the diet was substituted with successe, the serum cholesterol level was decreased. This fall and rise are significant.

As lactose is made up of glucose and galactose and the effect of glucose on serum cholesterol level is less, all attention should be focussed on galactose only as one of the etiological factors responsible for the elevation of cholesterol level in pregnancy. The exact mechanism as to how it works still remains obscure. It might be that after a certain concentration of lactose in the blood there must be a change in the galactose metabolism with the result that galactose 1-phosphate, may be converting itself into glucose-1 phosphate, there by, subjecting more glucose molecules for exidation processes. As a result of this a large number of acetate molecules must be accumulating which instead of exidizing themselves by way of tricarboxylic acid cycle might be following a pathway of cholesterol biosynthesis.

Several investigators concluded that cholesterol is increased late in pregnancy. This is due either to faulty elimination by the liver or to a retention preparatory for lactation. In toxeemia of

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pregnancy hepatic functions are much altered so there is a much more increased level of cholesterol.

### 3. Role of Immunology

According to De Alvarez, cholesterol in pregnancy increases as a result of response to foetal antigenic substances crossing the placenta and entering the maternal circulation through disruption in the continuity of the small villi. De Alvarez has postulated this special factor on the basis of Chino's experiment in which he has demonstrated immunization of rabbit with egg albumin followed by substantial elevation of total and free cholesterol.

### 4. Familial Inheritance

Familial hypercholesterolaemia is commonly said to be a predisposing condition for atherosclerotic heart disease. This familial disorder transmitted by simple Nendalian dominance (Piper and Orvild, 1955; Leonard, 1956; Harris-Jones et al. 1957).

5. Role of lactation and other factors during post partum period

Character . It was a way to the supplement of the

Herrmann and Neumann in 1912 studied that whole blood cholesterol and total lipid decreased during normal lactation but remained elevated when

lactation did not occur. According to Boyd (1935) the lipid concentration of blood plasma was found to decline consistently after delivery in all cases where normal lactation occured (group I). The decline in values of plasma lipids during lactation was in large part due to loss of plasma neutral fat. After neutral fat, the greatest decrease was found in the phospholipids and next in the free cholesterol and ester cholesterol. Changes in cholesterol fraction were comparatively slight. On the other hand when the breast were dried up (group II), plasma lipids fell in value only while the breasts were filling, and then actually rose again as the breasts responded to treatment and began to shrink in volume. This rise in blood lipids rather than fall during the puerperium is possibly due to following causes.

Pirstly, it may be postulated that the process of drying up of the breasts by limiting fluids etc. would also "dry up the blood", and automatically increase the concentration of plasma lipids. If this were so then the percentage of red cells should also increase. As a matter of fact, by doing suitable hematocrit readings, it was found that there actually occured a slight increase in the percentage of red cells in blood during the puerperium. But this increase was noted in both groups of puerperas.

i.e., those who lactated normally and those in whom
the breasts were dried up, and there was no appreciable
quantitative variation between the two groups. It
thus appeared that this explanation was inadequate to
account for the rise in plasma lipid values when the
breasts were dried up.

Secondly, it may be proposed that the fasting values of plasma lipids were increased by absorption of lipids from the full but non-secreting mammary glands. It will be recalled that while the breasts were filling in both groups of puerperas the value of plasma lipids fell and rose only after a binder was applied to the breasts. This may logically account for a slight increase in the level of plasma lipids even after a fast, the milk fats being gradually absorbed back again into the maternal blood stream. By the tenth day of post partum the breasts, if dried up after delivery, are usually quiescent, and yet at this time, the plasma lipids were found still high and even rising in value. Purthermore, the full breasts prevented from secreting milk could contain but a few grams of fet at the most, and it is doubtful if this small amount could have any material effect on the level of plasma lipids over any length of time.

trouble whose in the perfect the

It appears, therefore, that the phenomenon of lactation itself along with the various metabolic and endocrine changes which accompany it, is chiefly responsible for the difference in the trends of plasma lipids values between these two groups of puerperas. In other words, the body reacts to normal lactation by showing declining values for blood plasma lipids, and when lactation is stopped earlier than normal, the function of the body is altered in the direction of a lipemia in blood plasma. Whether the blood plasma lipids fall during lactation because they are secreted in milk or because of the presence or absence of certain hormones or other effects, cannot be stated at present.

as to where the excessive amounts of blood lipids go to once pregnancy is over. It has been proposed that in the puerperium blood lipids are discharged through the bile (Bacmeister and Havers, 1914) urine, sweat and in faeces (Herrmann and Neumann, 1912) and in milk. Most of these theories and according to Boyd (1934) fat content of blood is a static value. That is to say, these theories appear to take for granted that if a number of grams of lipids are removed from blood by the liver, kidney, intestinal tract sto., in the puerperium, this removal would

cause a lowering of the concentration of blood lipids. Blood lipids are continuously in equilibrium with tissue lipids; if lipids are removed from blood, the loss is made up by the addition of lipids from the fat depots. It is unlikely that any removal, except a very excessive one such as occurs in the increased metabolic rate of fevers (Boyd, 1935) could by itself account for a lowering of the value of blood lipids. It is the factors which influence the equillibrium between blood and tissue lipids that we must seek to explain the effect of pregnancy and of lactation. Boyd (1935) observed that in the puerperium this equillibrium is altered in the direction of a lowering of the level of plasma lipids, but if normal lactation is prevented, the change is inhibited or reversed.

Pontis, Gupta and Purandare (1978) have noted a significant fall in cholesterol level from antepartum to post-partum period. This denotes that placenta is the principal organ responsible for the elevation of cholesterol during pregnancy. It is also true that the hormonal levels which are effected during pregnancy are changed with eviction of placenta. Therefore, these levels may be indirectly responsible for the diminishing of lipid parameters.

It has been stated by Bermin and Von Studnits (1957)

that estrogens cause a rise in circulating lipid levels. Both estrogens and progestrogens are of placental origin. Therefore, the placenta itself is the primary cause for the elevation of lipids which slowly returns to the pre-gestational levels after the expulsion of placenta.

### 6. Role of diet

STORY PARKET FOR STATE OF STAT

Carried out the most complete studies so far reported on cholesterol metabolism, concluded that during period of fasting the cholesterol content of the plasma varies markedly in different healthy persons but is fairly constant in the subject himself, a single meal will cause no change, but prolonged diets, high or low in sterols will cause variation in the cholesterol. The free cholesterol remains fairly constant but the cholesterol ester shows greatest changes.

Bruger and Somach (1932), Okey and Stewart

(1933) have stressed the extent of diurnal variations

in blood cholesterol, even in normal subjects. They

conclude from data covering in each case observations

taken at 2 hour intervals or from 4 to 24 hours that

the indestion of food has no appreciable effect, either

early or late. Close examination of their figures

shows, however, that all the cases studied after ingestion of food were pathological, and certain of their figures suggest the possibility of other interpretations, notably the effect of water ingestion or of progressive loss of water during fasting.

Man and Gildea were able to show that an alimentary lipemia may be produced in man if 3.5 cms of fat per kilo of body weight be given but that a smaller ration containing about 0.5 cm of fat per kilo resulted in minor and inconstant variations in the blood lipids. It became apparent from the studies that an alimentary lipemia did not occur in human unless well over 200 gas of fat were taken at a single meal (Boyd, 1935).

According to Mullick and Bagga (1964) in the healthy female serum lipid level and its fraction vary with nutritional status, which is dependent on the socio-economic condition of the individual values for the high income groups are close to those reported by Boyd. The data for both vegetarians and non-vegetarians of low income group gave lower average figures. The comparison of the figures for vegetarians and non-vegetarians revealed that the average for the vegetarians were higher than for the non-vegetarians.

serially in a group of young women before and during pregnancy while they consumed their usual diet or a fat-modified diet known to have an hypocholesterolemic effect. During the first trimester of pregnancy there was a slight but definite decrease in serum cholesterol levels. After the first trimester, serum cholesterol levels increases gradually to a peak at or near term. These changes occur in both normal and hypercholesterolemic females and are not greatly influenced by the fat modified diets.

The rate of increase of newly synthesized cholesterol in the plasma of man is not significantly altered by dietary cholesterol (Nutritional Review, 1967). This suggested that man is unable to control cholesterol synthesis even when excess of cholesterol is present in the diet. However, in 1963, Bhattathiary and Siperstein reported that hepatic cholesterol production was reduced when dietary intake was high. This suggested that a diet high in cholesterol reduces endogenous synthesis.

The recent experiment of Taylor and his co-workers (1966), with isotopic tracers using D<sub>2</sub>O, quite clearly supports the view that man releases the same quantities of newly synthesised cholesterol into the serum daily, regardless of the amount of distary

cholesterol. This has been further supported by the experiments that the level of HMG-CO. A reductase, a key enzyme in cholesterol synthesis, is independent of food intake.

It has been demonstrated by Kuo and Bussett (1965) that a significant rise in serum cholesterol level occurred during the period of high sucrose intake in one of the subjects. Yudkin (1964) had expressed the possible etiological role of sucrose in the pathogenesis of coronary artery disease in man.

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MATERIAL AND METHODS

Character and Ch

#### MATERIAL AND METHODS

The present study was carried out in the Department of Obstetrics and Gynaecology and the Department of Biochemistry, M.L.B. Medical College, Jhansi, over a period of one year, starting from May 1984 to April 1985.

#### Selection of cases

Letter Mickey

The study comprised of patients attending outdoor clinic of the Department of Obstetrics and Gynaecology for antenatal examination; antenatal wards and from labour room, directly. The patients studied were broadly divided into following groups.

Group I - Normal pregnancy,

Group II - Toxaemia of pregnancy

- 1 2 Charles at (1) Pre-eclampela.
  - (11) Eclampsia.

<u>Pre-eclemptic patients</u> were taken to be those who developed hypertension after the 20th week of gestation with the following associated conditions.

- (a) Proteinuria,
- (b) Oedema,
- (c) Both a & b.

has recommended a blood pressure of 130/80 mm Hg as being the limit of normal at any time during pregnancy, with a rise of 30 mm Hg systolic or 15 mm of Hg diastolic blood pressure being considered abnormal. The blood pressures cited must manifest on at least two occasions 6 hours or more apart.

Proteinuria is defined as more than 0.3 g per litre in 24 hour collection, or greater than 1 g per litre in at least two random urine specimens collected 6 hours or more apart.

Eclamptic patients were taken to be those who developed convulsions, not caused by any coincidental neurologic disease such as epilepsy and fulfilled all the conditions setforth for pre-eclamptic patients as taken above.

Total number of cases studied were 46, out of which 24 cases were of normal pregnancy, 14 of pre-eclamptic toxaemia and 8 of eclampsia.

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#### Clinical Examination

cases regarding age, parity, socio-economic status, literacy level, history of present illness, past history, obstetrical history, menstrual history, family history, dietary history was taken as embeded in format. It was ensured that the patient did not suffer from any other disease which caused increased cholesterol level such as coronary heart disease, kidney disease, liver disease, diabetes mellitus.

The patients were examined and investigated in detail to detect toxaemia of pregnancy. The cases included in this study were in the last trimester of pregnancy nearing term.

General and systemic examination were done with special emphasis on ; general built of the patient, pallor, blood pressure, height and weight in kilograms.

The fundal height was assessed and the period of gestation was determined and it was ascertained if this corresponded to period of amenorrhed as told by the patient.

Per vaginal exemination was done on the patient having labour pains to ascertain whether she

was in labour or not, so that blood sample could be taken at appropriate time.

#### Pollowing investigations were performed.

- (i) Blood General blood picture to exclude anaemia,
  - Serum cholesterol,
  - Blood urea,
  - Serum uric acid.
  - Serum creatinine.

Blood urea, serum uric acid and serum creatinine done in cases of pre-eclampsia and eclampsia.

#### (ii) Urine :

- Volume,
- Specific gravity,
- Urine sugar,
- Urine Alb. (Cuantitative estimation by Esbach's method)
- Microscopic examination.

#### (iii) Fundus examination

#### Period of collection of blood samples

SACTOR CONTRACTOR STATE

Blood samples were withdrawn during following periods.

- (1) Antenatal period.
  - (a) From 28 weeks to 36 weeks of pregnancy.
  - (b) After completion of 36 weeks to 40 weeks of pregnancy.
- (2) During labour.

- (3) Within 24 hours of parturition.
- (4) After one week of delivery.
- (5) After 6 weeks to 8 weeks of delivery.

#### Method of collection of blood samples

5 ml of blood were withdrawn from antecubital vein of the patient subject to the following conditions.

- (1) she had fasted for 12-14 hours before such sample was taken,
- (ii) She had taken light meals prior to the period envisaged in condition No. (1),
- (iii) The blood was withdrawn without venous stasis.
- After withdrawing the sample, it was allowed to settle facilitating the serum to separate.
- Pulse and blood pressure was taken immediately after taking the blood sample.

#### Method of determination of total serum cholesterol.

The method employed in this study confirms
to the one used by Henly (1957) for the determination
of total serum cholesterol. The reagents and
technique is embodied as under -

#### Reacents -

- (1) Acetic acid acetic acid A.R. (aldehyde free).
- (2) Ferric chloride acetic acid reagent 0.05 per cent.
  Solution of Fe Cl<sub>2</sub>.6H<sub>2</sub>O in purified acetic acid.
- (3) Sulphuric acid. A.R.
- (4) Cholesterol standard 100 mg. in 100 ml. of Aldehyde free acetic acid.
- (5) Cholesterol standard for use The stock standard is diluted with the ferric chloride acetic acid reagent in 1 to 25 ratio.
  - (4) and (5) are kept in cool and dark place.

### Technique

- 0.1 ml. of serum was added to 10 ml. of the ferric chloride acetic acid reagent in a glass stoppered centrifuge tube.
- It was mixed well and kept for ten to fifteen minutes for protein to flocculate.

- This was centrifuged and 5 ml. of clear supernatant fluid was transfused to a glass stoppered centrifuge tube.
- For the standard, 0.1 ml. of physiological saline was mixed with 10 ml. of cholesterol standard for use and 5 ml. of this is transferred to a second stoppered centrifuge tube.
- 5 ml. of the ferric chloride acetic acid reagent was taken in third tube as blank.
- 3 ml. of sulphuric acid from a burette was added to all the three tubes, stoppered carefully and kept for twenty to thirty minutes.
- The unknown and standard was read against the blank using a yellow filter or at 560 millimicrones in Klett Summerson's Colorimeter and then calculation was made by following formula.

mg total cholesterol \_\_ Reading of unknown x 400 per 100 ml. serum Reading of standard

\*\*\*\*

### OBSERVATIONS

33

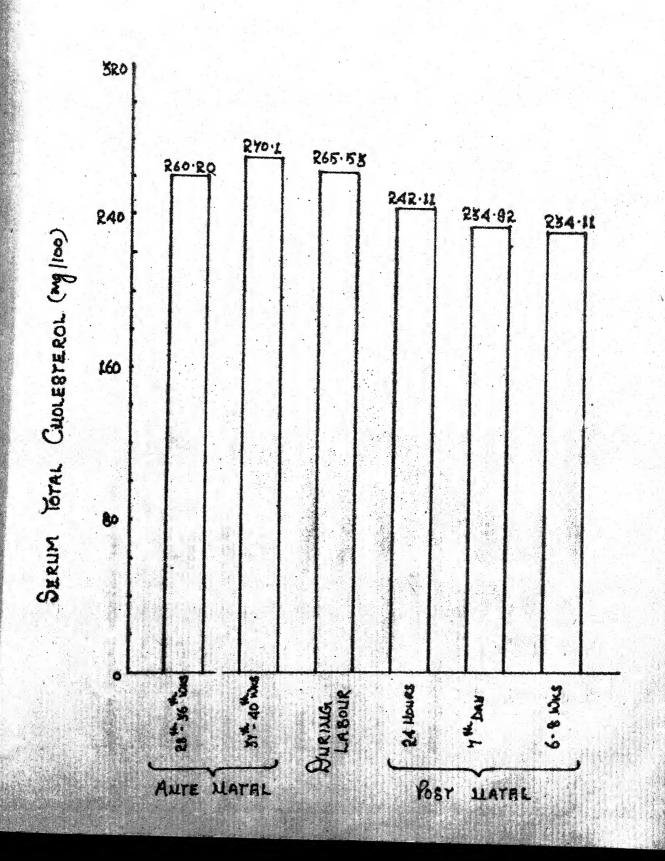
Table I

Serum total cholesterol velues in antenatal and post-natal period in subjects with normal

	Ante-mate		During Labour	Post	-Dartum Deri	8
	19 3	2005 4005 4005 4005 4005 4005 4005 4005	Just before delivery (111)	lst day of 7th day of 6-8 wks delivery delivery after (1v) (v) (v1)	7th day of delivery (v)	after delivery (v1)
50 00 00 00 00 00 00 00 00 00 00 00 00 0		20	15	18	12	9
	860.20	270,10	265.53	242.11	234.92	234.11
Standard fertection	06.90	+58.36	+47.86	₹20.6€	+71.04	+94.31
	165-369	176-351	188-357	166-375	160-351	149-500

Table I shows values of serum total cholesterol in 28th week to 36th week, 37th week to 40th week, during labour pains, within 24 hours of delivery, 7th day after delivery and 6th to 8th weeks after delivery. The results obtained are statistically insignificant.

# BAR DIAGRAM SHOWING VARIOUS MEAN SERUM TOTAL CHOLESTEROL (MY/1007) VALUES IN CONDITIONS OF MORMAL PREGNANCY



Serum total cholesterol values in antenatal and post-nat

(111) (11) (1v) (v) 13 (1v) (v) 13 10 274.10 257.77 263.00 13 ±65.12 ±55.74 ±57.77 130 189-400 195-502 156-360	4011very delivery of 7th day of 6  (111)  (12)  (14)  (14)  (14)  (19)  (274.10  257.77  263.00  ±65.12  ±55.74  ±57.77  189.400  195.502  156.360  Table II shows values of serum to	28th to 39th 35th 35th	II a	Just be fore	Post	Partum perio	
288.79 274.10 257.77 263.00 £77.43 £65.12 ±55.74 £57.77 189-430 189-400 195-502 156-360	13 10 274.10 257.77 263.00 ±65.12 ±55.74 ±57.77 189-400 195-502 156-360 Table II shows values of serum t	3	(44)	delivery (111)	delivery	7th day of delivery	
288.79 274.10 257.77 263.00 <u>4</u> 77.43 <u>4</u> 65.12 ±55.74 <u>4</u> 57.77 189-430 189-400 195-502 156-360	288.79 274.10 257.77 263.00  £77.43 ±65.12 ±55.74 ±57.77  189-430 189-400 195-502 156-360  £16ant values are Table II shows values of Serum to		•	2	13	Œ S	(3)
177.43 ±65.12 ±55.74 ±57.77 189-400 195-502 156-360	±65.12 ±55.74 ±57.77 189-400 195-502 156-360 Table II shows values of serum to	264.93	288.79	274.10	250 23	2	2
189-430 189-400 195-502 156-360	189-400 195-502 156-360 Table II shows values of serum t	\$1.00	\$77.43	+65.10		*93.00	224.69
189-430 189-400 195-502 156-360	189-400 195-502 156-360 Table II shows values of serum t	2002			+22°74	157.77	155.05
	Table II shows values of serum t		109-400		195-502	156-360	150-335

of delivery, 7th day after delivery and 6th to 28th wk to 36th wk, 37th wk to 40th wk, during labour pains, within 24 hours Sth weeks after delivery.

(t = 2.0639, P 20.05)

(t = 2.0796,

Statistically significant values are

(PA) 8A (AS)

(TA) 84

E

(t = 2.7969,

BAR DIAGRAM SHOWING VARIOUS MEAN SERUM
TOTAL CHOLESTEROL (MY 100) VALUES IN CONDITIONS
OF PRE ECLAMPSIA

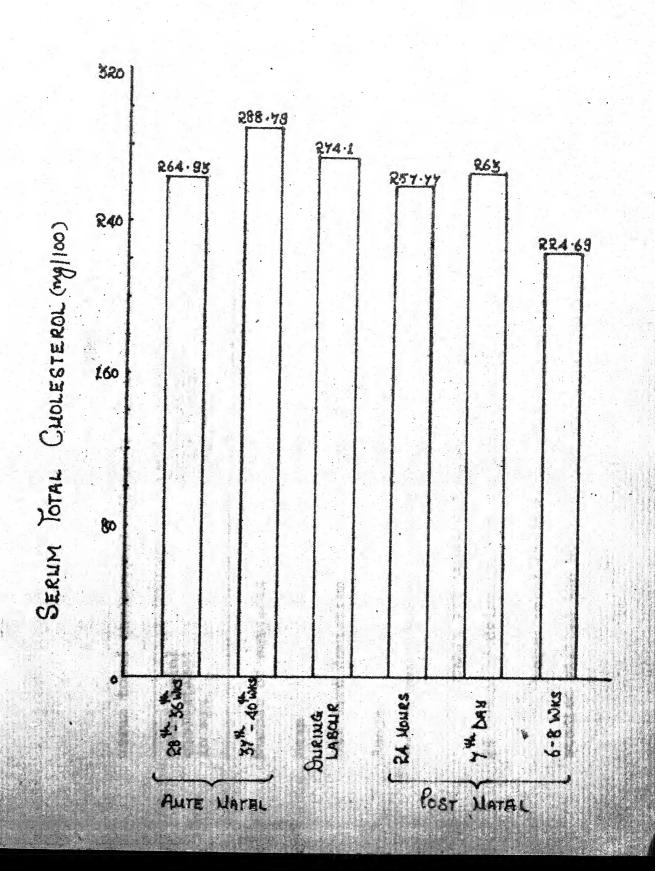


Table III

Serum total cholesterol values in labour and post-natal period in subjects with eclampsia.

(1) (1)
259.00
482.50
179-370

Table III shows values of serum total cholesterol during labour pains, within 24 hours of delivery, 7th day after delivery and 6th to 8th weeks after delivery. Serum total cholesterol could not be estimated in antenatal period on the patients studied visited the hospital for the first time while they were in labour.

BAR DIAGRAM. SHOWING VARIOUS MEAN SERUM TOTAL
CHOLESTEROL (MY/100) VALUES IN CONDITIONS OF
ECLAMPSIA

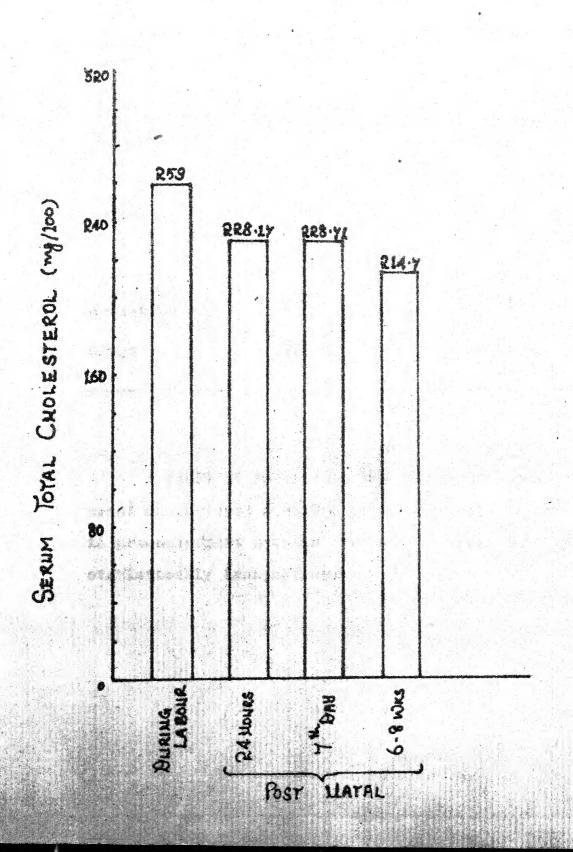


Table IV

Serum total cholesterol values in conditions of normal pregnancy and pre-eclampsia (28th week to 36th week).

Serum total cholesterol in mg%	Normal pregnancy (1)	Pre-eclampsia (ii)
Number of subjects	24	14
Mean	260.20	264.93
Standard deviation	<u>+</u> 56.90	±47.16
Range	165-368	200-368

Table IV shows that the values of serum total cholesterol obtained in normal pregnancy and in pre-eclampsia between 23th week to 36th week are statistically insignificant.

<u>Table V</u>

Serum total cholesterol values in conditions of normal pregnancy and pre-eclampsia (37th week to 40th week).

Serum total cholesterol in mg%	Normal pregnancy	Pre-eclamptic toxaemia (ii)
Number of subjects	20	
Mean	270.10	288.79
Standard deviation	±58,36	±77.43
Range	176-351	189-430

Table V shows that the values of serum total cholesterol obtained in normal pregnancy and in pre-eclampsia between 37th week to 40th week are statistically insignificant.

MULTIPLE BAR DIAGRAMS - SHOWING COMPARISON OF MEA SERUM TOTAL CHOLESTEROL (mg/100) VALUES SU CONDITIONS OF WORMAL PREGNAMICY AND PRE-ECLAMPSIA SU AUTE MATTIL PERIOD

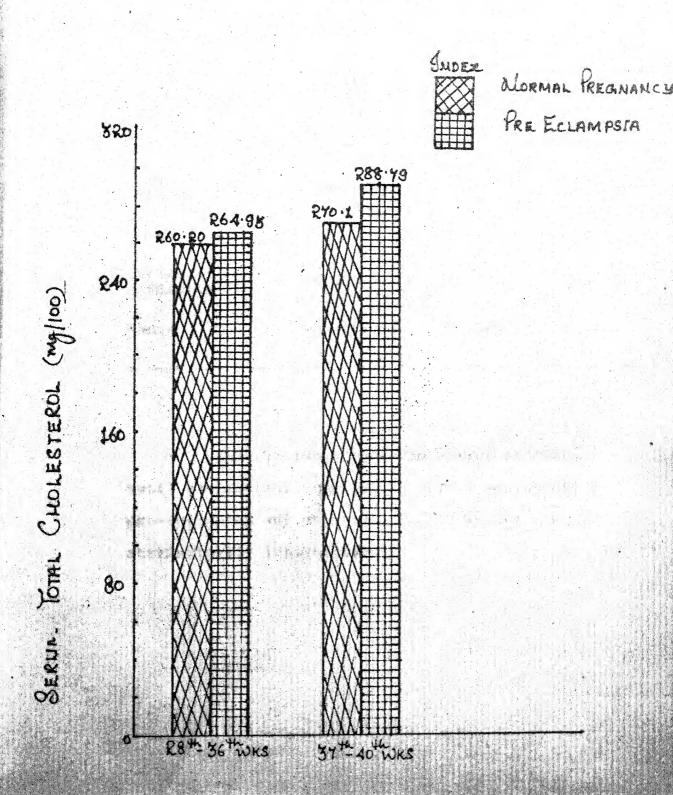


Table VI

Serum total cholesterol values in conditions of normal pregnancy, pre-eclampsia and eclampsia (during labour).

15	(11)	7
15	13	7
55.53	274.10	259.00
17.83	±65.12	±82.50
18-357	189-400	179-370

Table VI shows that the values of serum total cholesterol obtained in normal pregnancy, pre-eclampsia and eclampsia during labour are statistically insignificant.

Washing after black to the layers of the layers



Table VII

Serum total cholesterol values in conditions of normal pregnancy, pre-eclampsia and eclampsia (within 24 hours of delivery).

Serum total cholesterol	Normal pregnancy	Pre- eclampsia	Eclampsia
in mg%	(1)	(11)	(111)
Number of subjects	18	13	6
Nean	242.11	257.77	229.17
Stendard deviation	±50.66	±55.74	±48.02
Range	166-375	195-402	162-300

total cholesterol obtained in normal pregnancy.

pre-eclampsia and sclampsia within 24 hours of
delivery are statistically insignificant.

Table VIII

Serum total cholesterol values in conditions of normal pregnancy, pre-eclampsia and eclampsia (on 7th day of delivery).

Serum total cholesterol in mg%	Normal pregnancy (1)	Pre- eclampsia (ii)	Eclampaia (111)
Number of subjects	12	10	7
Mean	234.92	263.00	228.71
Standard deviation	±71.04	±57.77	±51.98
Range	160-351	156-360	136-280

rable VIII shows that the values of serum total cholesterol obtained in normal pregnancy, pre-eclampsis and eclampsis on 7th day of delivery are statistically insignificant.

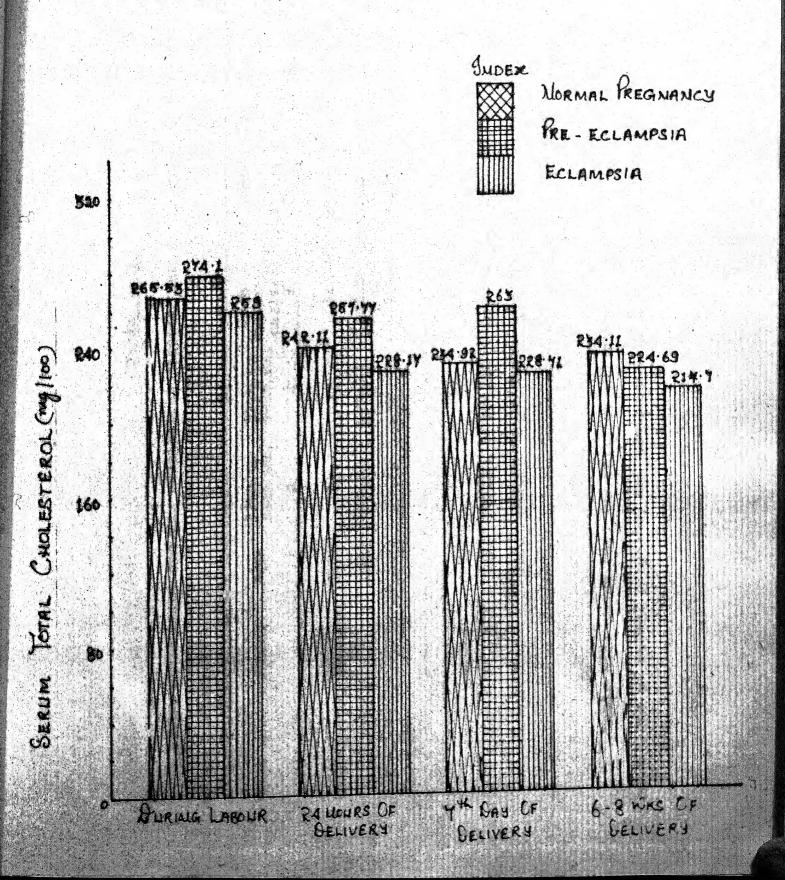
Table IX

Serum total cholesterol values in conditions of normal pregnancy, pre-eclampsia and eclampsia (6-8 weeks after delivery).

Serum total cholesterol	Normal pregnancy	Pre- eclampsia	Eclampsia
in mg%	(1)	(11)	(111)
Number of subjects	18	13	7
Mean	234.11	224.69	214.70
Standard deviation	±94.31	±55.05	±47.85
Range	149-500	150-335	136-261

Table IX shows that the values of serum total cholesterol obtained in normal pregnancy, pre-eclampsia and eclampsia after 6-8 weeks after delivery are statistically insignificant.

MULTIPLE BAR DIAGRAMS SHOWING VARIOUS MEAN SERUM
TOTAL CHOLESTEROL (MY1100) VALUES SN CONDITIONS OF
MORMAL PREGNANCY, PREECLAMPSIA AND ECLAMPSIA
DURING LABOUR AND BOST PARTIM PERIOD



seble X (1)

Total serum cholesterol and its statistical significance in relation to parity in subjects of

			And in contrast of the last of	AND DESCRIPTION OF THE PERSON	The second secon		***
	ě	28th to 36th wk.	37th to 40th sk.	Just before delivery	ist day of delivery	7th day of delivery s	6-8 weeks after delivery
Perlad	•	. 2	3	2	27		3
		261.43	270.61	266.50	239.00	224.00	229.66
	3	S.D. ±55.44	±53.15	+48.38	137.22	+64.70	+70.66
		* * * * * * * * * * * * * * * * * * * *		! .	1 10	m	•
	s			262.66	245,50	243.00	243,00
3		S.D. ±63.63	171.70	156.9	+77.35	-74.43	1138.32

Table X(1) shows that the relation of values of serum total cholesterol and parity in conditions of mormal prognancy was statistically insignifficant.

Table X (44)

Total serum cholesterol and its statistical significance in relation to parity in subjects of pre-colompeta.

	\$	28th to 36th wk.	37th to 40th wk.	Just before delivery	ist day of delivery	7th day of delivery	6-8 weeks after delivery
				7	1	, ,	•
Print gravida	No.	270.50	338.75	308.14	275.15	261.71	230.00
3	5.D.	156.81	+83.75	161.38	+67.08	+68.74	£67.27
		vo	1 0	1 1 10 1			! .
Malet		257.75	249.80	234,33	237.50	266.00	202.33
•	S.D.	±33.88	±67.25	+46.21	+33.78	+28.68	+36.09

Table X(ii) shows that the relation of values of total serum cholesterol and parity in conditions of pre-eclampsia was statistically insignificant except in two groups of cases.

- II(A) 2 vs II(B) 2 = Significant
   (P ∠ 0.05, t = 2.4),
   i.e. the serum total cholesterol level of
   primi and multi-gravida in condition of
   pre-eclampsia during 37th to 40th week of
   gestation.
- 2. II(A) 3 vs II(B) 3 = highly significant
  (P \( \( \) 0.01, \( \) t=3.17).

i.e. the serum total cholesterol level of primi and multi-gravide in condition of pre-eclampsia just before delivery.

Table X (111)

Total serum cholesterol and its statistical significance in relation to parity in subjects of

	ě	Just before	Ist day of delivery	7th day of delivery 5	6-8 weeks after delivery
	•		8		9
	ş	273.20	241.40	213.86	227.83
3	o s	89*087	139.66	±39 • 04	136.08
				1	
		189.00	162.00	150.00	136.00
•	6.D.			•	•

Table X(111) shows that the relation of values of serum total cholesterol and parity 10 constitues of colonnes with significance could not be calculated because of modesprate date in coses of multigranida

## Table XI (1)

Total serum cholesterol and its statistical significance in relation to socio-economic status in subjects of normal pregnancy.

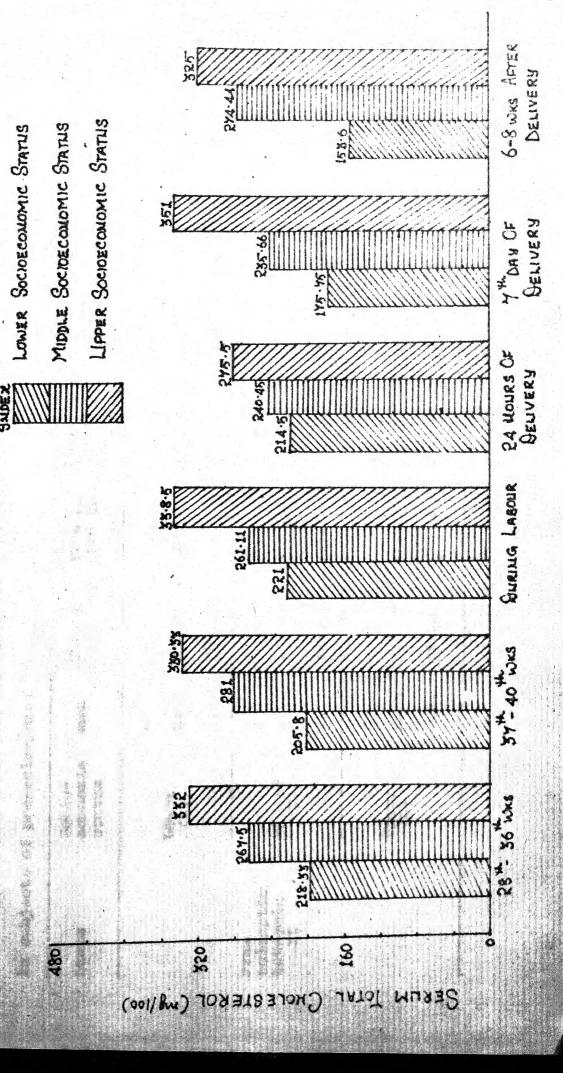
I	1	-				The second secon				
885			*	88 88	23. 60. 60. 60. 60. 60. 60. 60. 60. 60. 60	Just before delivery 3	Ist day of delivery	7th day of delivery	6-8 weeks after delivery	
		412 (42)		· •	•	•			5	
	12	1, 341			205,80	221.00	\$14.50	175.75	153,60	
			8.0.	\$0.6	+27.55	₹30.70	129.28	+15.84	+ 3.28	
		no in			1 2	1 6	=======================================	1 10		
		re.	8	267,50	281.00	261.11	240.45	235,66	274.44	
			3.D.	+39.64	€\$9.40	+35.09	158.60	+52.52	+102.11	
		1-1-7			i i e	 		100		
5				332.00	330,33	338.50	275.50	351,00	325.00	
	*0.44 10.24	ara t	8.8	437.89	±18.58	226.16	23.23	0		*
	The second second	-	The transmission of the last o	Minneson and American Street, Square,						

Table XI(i) shows that in normal pregnancy, the relation of values of serum total cholesterol with socio-economic status were statistically significant and highly significant except

- 1. I(B) 2 vs I(C) 2 insignificant
  P \( \\_ 0.05 \), t = 1.86,
  i.e. the serum total cholesterol level of subjects
  belonging to middle and upper socio-economic
  status in conditions of normal pregnancy during
  37th to 40th week.
- 2. I(A) 4 vs I(B) 4 insignificant

  P ∠0.05, t = 0.94,
  i.e. the serum total cholesterol level of subjects
  belonging to lower and middle socio-economic
  status in condition of normal pregnancy within
  24 hours of delivery.
- 3. I(B) 4 vs I(C) 4 insignificant
  p \_ 0.05, t = 1.76,
  1.e. the serum total cholesterol level of subjects
  belonging to middle and upper socio-economic
  status in condition of normal pregnancy within
  24 hours of delivery.

SERUM TOTAL STATUS SU MORMAL PREGNANCY 当 MULTIPLE BAR DIAGRAMS SHOWING THE RELATIONSHIP OF CHOLESTEROL (Mylow) LEVELS WITH SOCIOECOMOMIC



Teable XX (44)

Total serum cholesterol and its statistical significance in relation to socio-economic status in subjects of pre-colempale.

e is l	. <b>.</b>	28th to 36th wk.	37th to 40th 9k.	Just before delivery	Ist day of delivery	7th day of delivery	6-8 weeks after delivery
		•	**	•	n		
		230.00	189.00	236,00	246,00	274.66	200,33
	8.D.	±36.00		#72.08	±62.21	126.15	133.65
	a		6	*	· •		
	100	248.20	245.66	250,75	226.25	242,66	216.80
	S,D.	+41.06	±21.07	±51.27	121.68	+82 - 39	+69.40
		٠	w	9	٠	*	•
# (C)	Nega Ca	296.33	334.60	308,66	294.66	269.50	244,73
	9.0	144.36	172,52	±61.48	+62,33	+66.53	+54.99

Table XI(ii) shows that in pre-eclamptic state, the relation of values of serum total cholesterol with socio-economic status were statistically insignificant except in

- II(A) 1 vs II(C) 1 = highly significant
   P \( \subseteq 0.01, \) t = 3.63,
   i.e. serum total cholesterol level of subjects
   belonging to lower and upper socio-sconomic
   status in condition of pre-eclampsia during
   28th to 36th week.
- 2. II(B) 1 vs II(C)1= highly significant,
  P \( \sum\_{0.01} \), t = 6.65,
  i.e. serum total cholesterol levels of subjects
  belonging to middle and upper socio-economic
  status in condition of pre-eclampsia during
  28th to 36th week.

MULTIPLE BAR BIAGRAMS SHOWING THE RELATIONSHIP OF THE SERUM TOTAL CHOLESTEROL (My/100) LEVELS WITH SOCIOECONDMIC STATUS SU PRE ECLAMPSIA

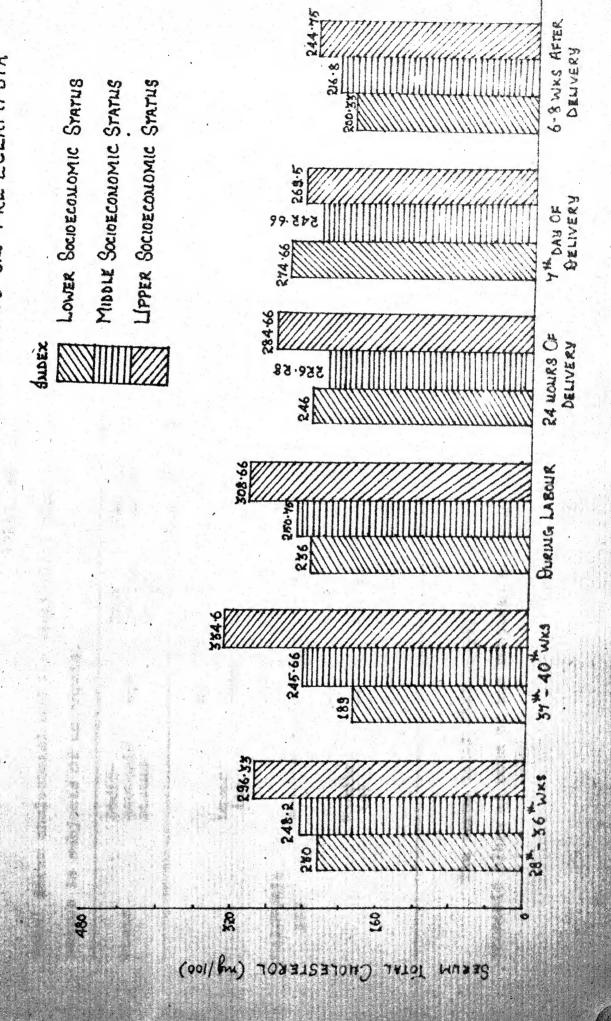


Table XI (411)

Total serum cholesterol and its statistical significance in relation to socio-economic status in subjects of celampsia.

		1	Just before delivery 3	Ist day of delivery	7th day of delivery	6-8 weeks after delivery
					•	
	k	Me	194.66	208,75	205.60	194.00
Ė		S.D.	+19.85	140.11	±46.91	£40.29
		4			   m   m	
		Mean	323,33	267.00	267.00	255,00
		S.D.	156.86	146.66	+13.00	+ 5.50

The serum total cholesterol level could not be estimated in the upper socio-

economic class as none of the subjects belonged to that class.

MULTIPLE BAR DIAGRAMS-SHOWING THE RELATIONSHIP OF THE SERUM TOTAL CHOLESTEROL (my/100) LEVELS WITH SOCIO-ECONOMIC STATUS JU ECLAMPSIA

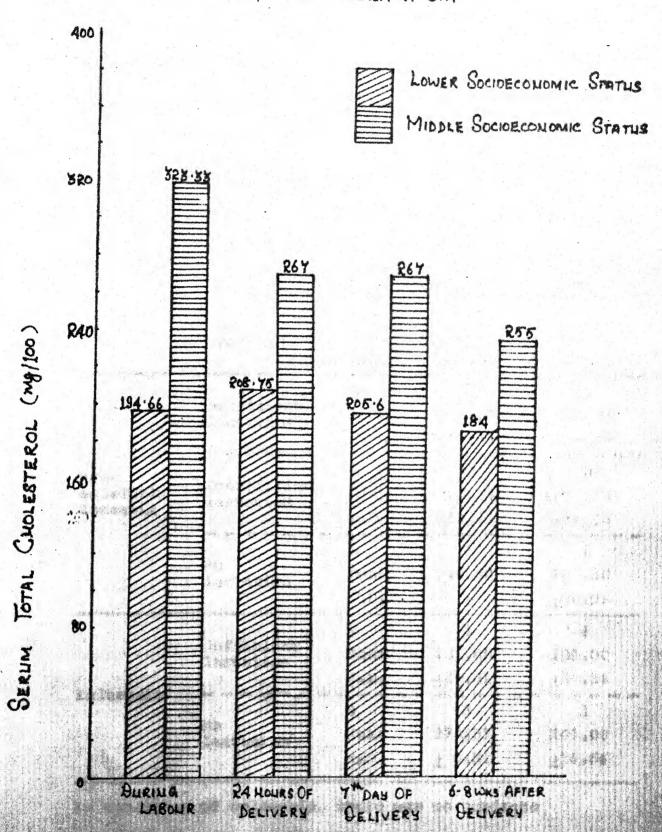


Table XII

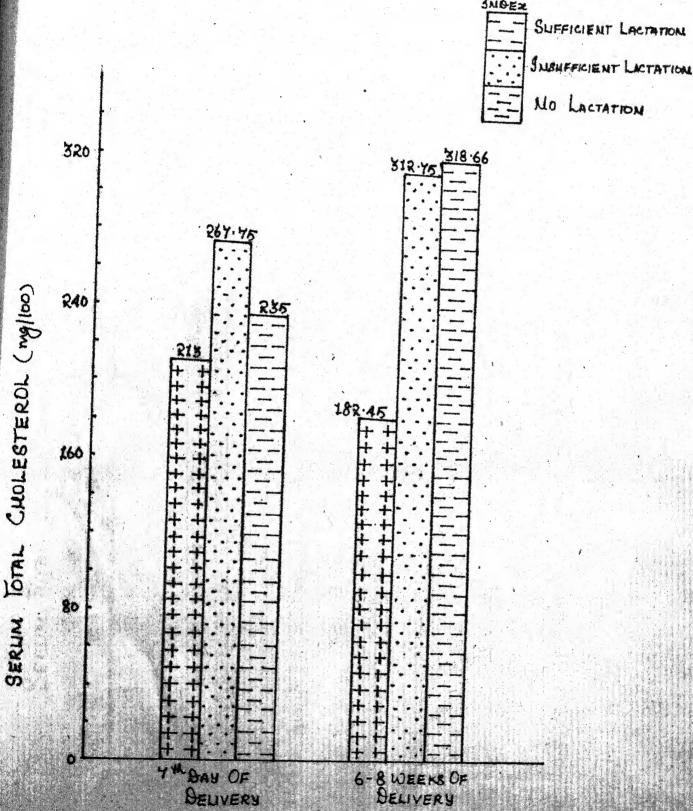
Total serum cholesterol and its statistical significance in relation to lactation in normal pregnancy, pre-eclamptic and eclamptic subjects.

State	Level of lactation	mg%	7th day of delivery	6-8 weeks after delivery
	Sufficient lactation	n Mean	213.00	11 182.45
formal pregnancy	Insufficient	n Mean	±58.15 	±35.00 
	~ ~ ~ ~ ~ ~ ~	S.D.	±96.95	_ ±35.26
	No lactation	Mean S.D.	235.00 ±56.56	318.66 ±172.75
(100 <b>4</b>	Sufficient lactation	n Mean S.D.	5 238.60 ±57.31	6 188.00 ±28.28
ro- elamptic oxaemia	Insufficient lectation	n Mean S.D.	3 276.66 ±43.00	261.33 ±59.46
	No Jackstion	Mean S.D.	360.00	2 263.50 ±86.97
	Sufficient lactation	n Mean S.D.	5 201.80 ±40.41	4 189.00 ±48.34
		Meen S.D.	3 273.33 ± 6.50	3 249.00 ±16.64

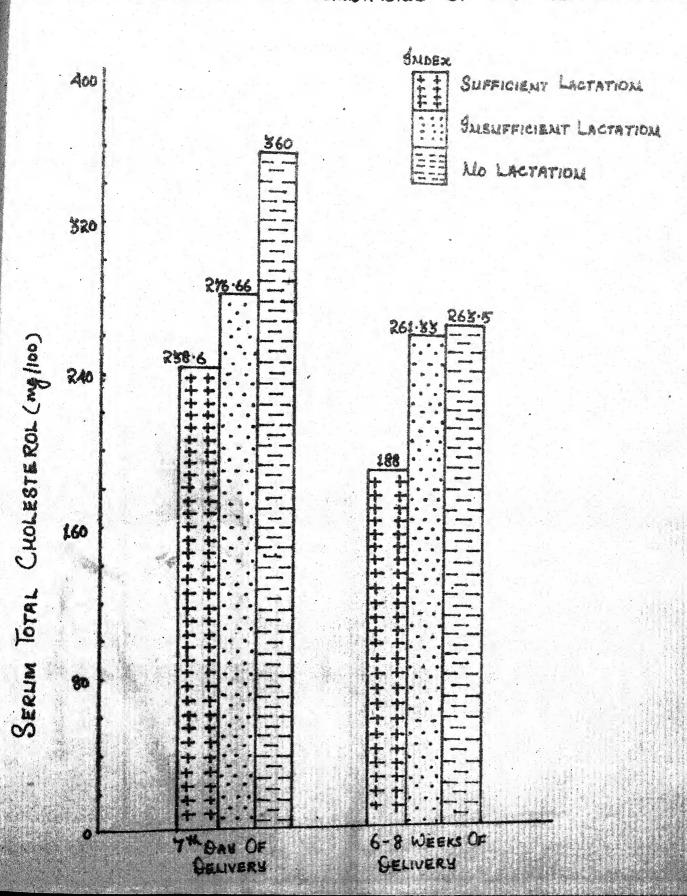
In condition of selampals, there was no subjects belonging to group of insufficient lactation. and in condition of pre-eclampsia, on 7th post partum day the relation of serum total cholesterol and breast feeding or top feeding or both were statistically insignificant. Subjects of insufficient lactation as compared to those with no lactation the serum total cholesterol levels were statistically insignificant but subjects of sufficient lactation when compared with those of insufficient lactation and no lactation the levels were found to be statistically highly significant.

In condition of eclempsia, on 7th day of delivery, the subjects of sufficient lactation when compared with those of no lactation, the serum total cholesterol levels were found to be statistically highly significant. Similarly after 6-8 weeks of delivery, the values were statistically significant, in the conditions of normal pregnancy and precedences also.

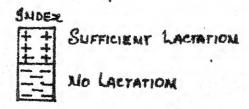
MULTIPLE BAR DIAGRAMS- SHOWING THE RELATIONSHIP OF THE SERUM TOTAL CHOLESTEROL (MINO) LEVELS WITH LACTATION STATUS IN CONDITIONS OF NORMAL PREGNANCY



MULTIPLE BAR DIAGRAMS SHOWING THE RELATIONSHIP OF THE SERUM TOTAL CHOLESTEROL (mg/100) LEVELS WITH LACTATION STATUS SU CONDITIONS OF PRE-ECLAMPSIA



MULTIPLE BAR DIAGRAMS-SHOWING THE RELATIONSHIP OF THE SERUM TOTAL CHOLESTEROL (mg/100) LEVELS WITH LACTATION STATUS SN. CONDITIONS OF ECLAMPSIA



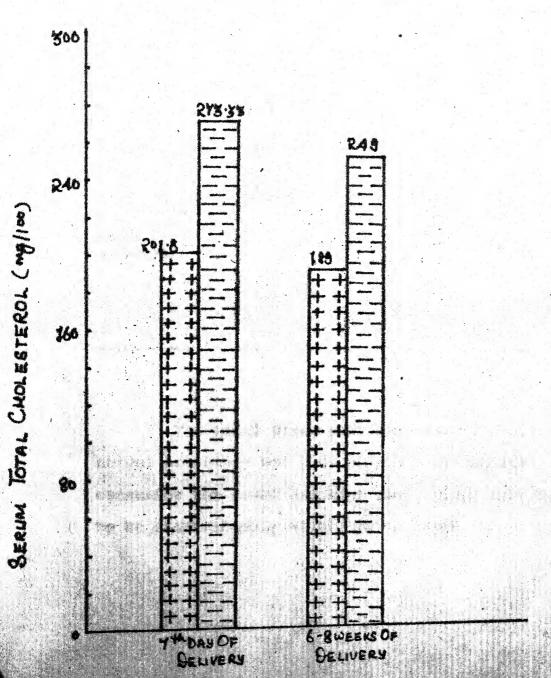


Table XIII

Total serum cholesterol and its statistical significance with the intake of usual and high fatty diet in conditions of normal pregnancy and pre-eclampsia (37th - 40 th week).

State	Pat consumption	mg%	37th to 40th wk.
		n	14
	Usual "	Mean	246.43
ormal regnancy	-	S.D.	±50.08
* alimir.l		n	6
	High fat	Mean	325,33
		S.D.	±34.64
			5
	Usual	Mean	231.20
ro-	***	S.D.	±28.71
clampsia			4
	High fat	Mean	360.75
	The state of the s	S.D.	±49.54

The total serum cholesterol levels during normal pregnancy and pre-eclampsia of subjects consuming the usual and high fatty diets were found to be statistically highly significant.

MULTIPLE BAR DIAGRAMS SHOWING THE RELATIONSHIP OF THE SERUM TOTAL CHOLESTEROL (M/100) LEVELS WITH DIET IN CONDITIONS OF YORMAL PREGNANCY AND PRE-ECLAMPSIA IN ANTENATAL PERIOD

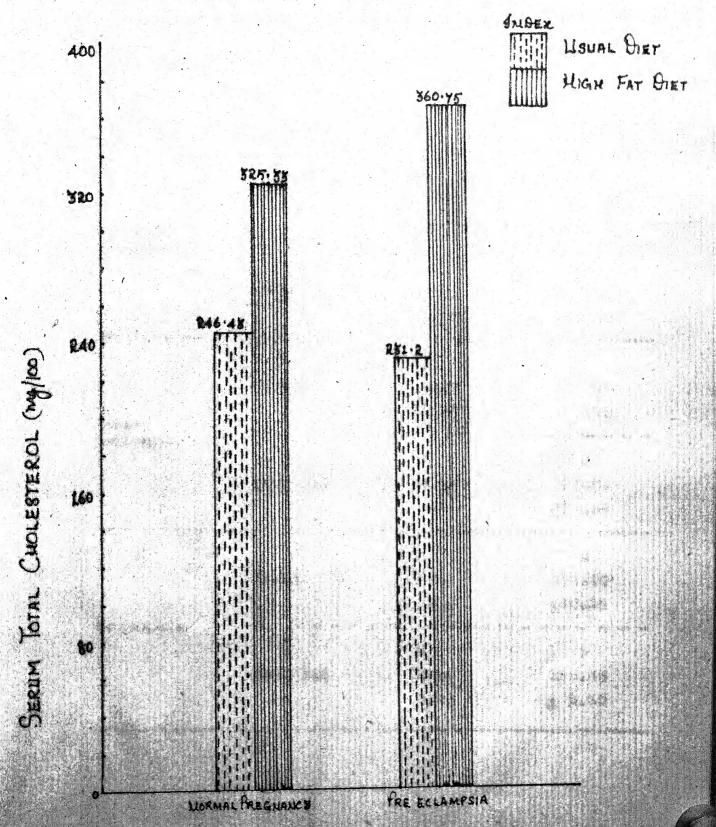


Table XIV

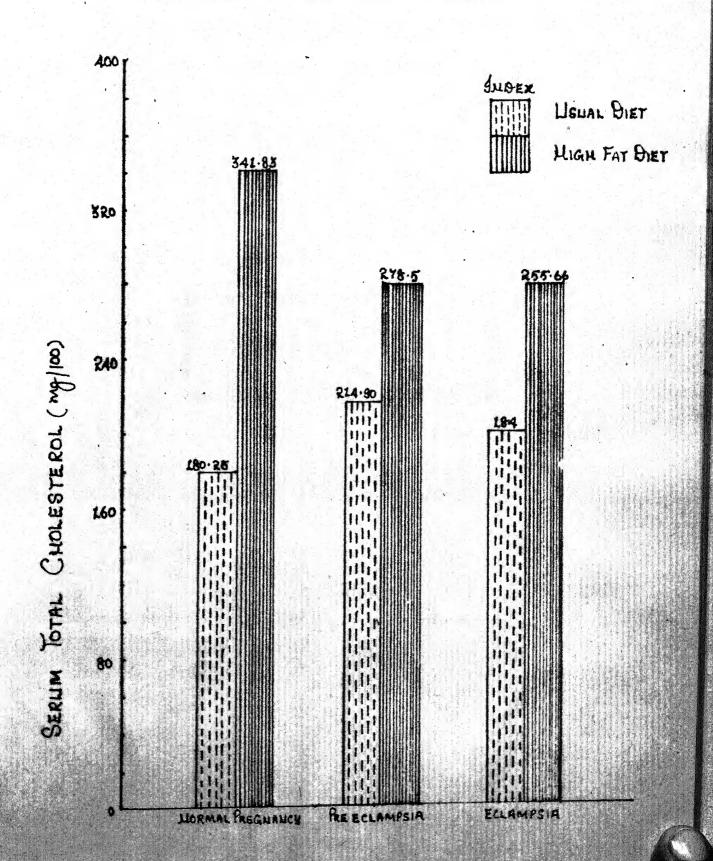
Total serum cholesterol and its statistical significance with the intake of usual and high fatty diet in condition of normal pregnancy, pre-eclampsia and eclampsia (after 6-8 weeks of delivery).

State	Fat con- sumption	mg%	6-8 weeks after delivery
		n	12
	Usua1	Mean	180.25
Normal pregnancy	-	5.D.	±34.24
hraditaries.		n	6
	High fat	Mean	341.83
		S.D.	±82.31
			11
	Usual	Mean	214.90
Pre-		S.D.	±49.20
<b>BClampale</b>		a	
	High fat	Mean	278.50
	N. C.	S.D.	±72.83
	Usual	Mean	184.00
clempsia		8.D.	240-29
	High fat	Mean	255,66
		S.D.	± 5.50

The total serum cholesterol levels after 6-8 weeks of delivery in normal pregnancy, preeclampsia and eclampsia of subjects consuming the usual and high fatty diets were found to be statistically highly significant.

\*\*\*\*

MULTIPLE BAR DIAGRAMS-SHOWING RELATIONSHIP OF THE SERUM TOTAL CHOLESTEROL (MY 1100) LEVELS WITH DIET SU CONDITIONS OF MORMAL PREGNANCY, PRE ECLAMPSIA AND ECLAMPSIA SU POST MATAL PERIOD.



# DISCUSSION

#### DISCUSSION

In the modern era hypercholesterolaemia is seen to be a major problem. Hence it becomes essential to correlate the total serum cholesterol levels with normal pregnancy and the different toxic states as for e.g. pre-eclamptic and eclamptic toxaemia. The present study was conducted keeping the above fact into view.

It has been established by Boyd, (1934), Dieckmann and Wegner (1934), Schwarz et al (1940), Peters et al (1951), Russ et al (1954), Smith et al (1959), that during normal pregnancy upto full term there was a rising trend of the serum total cholesterol level which progressively decreased after delivery. While in pre-eclamptic and eclamptic toxaemia, it has been established that there is an increasingly rising trend in the serum total cholesterol levels (Nelson, 1966; Pontis and Purandare, 1972; Hytten and Lind, 1973; Chaturvedi, Tandon and Singh, 1978).

The present study was thus conducted and the total serum cholesterol levels were estimated in conditions of normal pregnancy, pre-eclampais and

eclampsia during the different periods of gestation, labour and in early and late post partum period. The levels were then compared amongst the different conditions and finally the serum total cholesterol levels were also estimated on the basis of different parameters which have an effective bearing on the above conditions like socio-economic status, parity, dietary habits and lactation.

The serum total cholesterol levels when estimated in antenatal and post natal periods in subjects with normal pregnancy and pre-eclampsia were observed to rise upto term and fall during the post natal period. The results when statistically estimated were found to be insignificant except in a few cases of pre-eclampsia where the results were found to be statistically significant.

In condition of eclampsia, the serum total cholesterol levels were observed to fall during the post natal period, from labour onwards. Though the results thus obtained were statistically insignificant.

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A comparison between the levels of total serum chalesterol was done during the 18th - 40th week of gestation in conditions of normal and pre-eclemptic subjects. The results concluded were

found to be statistically insignificant though the levels were greater in conditions of pre-eclampsia when compared with that of normal pregnancy. Similar view is held by Dr. Alvares (1961) but according to Scandrett (1959) there was not much change in cholesterol levels in severe pre-eclampsia subjects when compared with normal gravida.

A comparative study was done in condition of normal pregnancy, pre-eclampsia and eclampsia for the serum total cholesterol levels, during labour, within 24 hrs of delivery, on the 7th post partum day and 6-8 weeks of delivery. It was observed that the values in pre-eclamptic subjects were higher when compared with that of normal pregnancy and a comparatively lower values during eclampsia though the above results were statistically insignificant. The exact cause of the results cannot be elucidated. The decreese can be attributed to the fact that during eclampsia due to hepatic insufficiency, the endogenous production of cholesterol is curtailed, and simultaneously no cholesterol is given to the patient via the exogenous route also probably this could account for the fall in the cholesterol levels.

Konttines and Pyotals (1964) had done a similar study and deduced that the level of cholesterol

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were higher in pre-eclamptic subjects when compared with those of normal pregnancy, and the results were also statistically insignificant, except during delivery when a statistically higher levels were seen.

The relation of serum total cholesterol during normal pregnancy, pre-eclampsia and eclampsia with parity was studied and there was no positive relation concluded. Further research work is needed in this field to sought out the relation of parity in the above three conditions.

The relation of the cholesterol levels with the socio-economic status was studied and was observed that in normal pregnancy and in eclampsia there was a positive relation of the cholesterol levels with the socio-economic status, while no such relation could be sought out in pre-eclamptic subjects.

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Cholesterol levels in relation to sufficient
Lactation, insufficient and no Lactico after 6-8 weeks
of delivery were found to be statistically highly
significant in conditions of insufficient and no
lactation when compared with sufficient lactation in
cases of normal pregnancy and pre-ectamps: whereas
no such relation could be observed in subjects of no
lactation and insufficient lactation on the 7th day

of delivery. The levels of cholesterol in all the conditions of lactations were statistically insignificant.

In eclamptic subjects both on 7th and 6-8 weeks of delivery in all the three conditions, the levels were statistically significant on the 7th day and highly significant after 6-8 weeks of delivery. The reason of this can be attributed to the fact that in eclamptic subjects, there is initially no endogenous cholesterol production and there is also a failure to take cholesterol exogenously, besides this the cholesterol saved due to no lactation or insufficient lactation gives an apparently increased level of cholesterol.

According to Neumann and Herrmann (1912), Boyd (1935), the total blood cholesterol and total lipids decreased during normal lactation, but remained elevated when lactation did not occur.

The relation of diet with the serum total cholesterol levels during the ente-natal and post natal periods of normal pregnancy, and pre-eclampsia showed a positive relation with high fatty diet, even in condition of eclampsia during the post natal period (ante-natal could not be studied). There was observed

a positive relation of the cholesterol level with high fatty diet.

According to Mullick and Bagga (1964) there is no relation of serum total cholesterol with the high fatty diet in condition of normal pregnancy.

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## CONCLUSION

The present study was conducted to estimate the total serum cholesterol levels in conditions of normal prognancy, pre-eclamptic and eclamptic tomania during unto-partum, labour, early post partum and late post partum periods.

- I wole in the ente-matol period which fell in the past pertur period in condition of normal programmy and pro-estampsia, though statistically the results were proved to be insignificant except in a few pro-estamptic subjects where the results were statistically significant.
- 2. The lovels of serus total depleatened full programmingly after labour in condition of colompole, though the results were insignificant.

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- 4. The serum total cholesterol levels during labour and post partum period in conditions of normal pregnancy, pre-eclamptic toxaemia and in eclampsia when compared with each other, the levels were higher in pre-eclampsia than in normal pregnancy and were lower in eclampsia, though the results were statistically insignificant.
- 5. The serum total cholesterol levels in conditions of normal pregnancy, pre-eclampsia and eclampsia in relation to parity showed to be an insignificant variable.
- increasing trend with the rise in socio-economic status in conditions of normal pregnancy and eclampsia. Thus proving socio-economic status to be a significant variable, while in pre-eclampsia there was no relation of cholesterol levels with the socio-economic status.
- The serum total cholesterol levels in conditions
  of normal pregnancy, pre-eclamptic towarmia and
  eclampais in subjects with sufficient, insufficient
  and no lactation were compared on the 7th post
  partum day and after 6-2 weeks of delivery. The

highly significant in condition of insufficient and no lactation when compared with sufficient lactation in cases of normal pregnancy and pre-eclampsia, whereas there was no such relation in subjects of no lactation and insufficient lactation. On the 7th day after delivery, the levels of cholesterol in all the conditions of lactation were statistically insignificant.

In eclamptic subjects, both on 7th day and after 6-8 weeks of delivery in all the three conditions of lactation, the levels were statistically highly significant after 6-8 weeks and significant on 7th day.

The serum total cholesterol levels in conditions of normal pregnancy and pre-eclamptic towards, showed a positive relation with high fatty diet during ante-natal and post natal periods, whereas in eclamptic subjects the levels of cholesterol had a positive relation with high fatty diet during the post natal period. The above results were all statistically highly significant.

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PORMAT EMPLOYED TO ELICIT INFORMATION FROM THE PATIENTS FOR THE PURPOSE OF THE STUDY

Name :

Address

Occupation

Husband's occupation :

Total number of family members :

Total family income :

Cualification

(i) Duration of cessation of Menses (in weeks)

or was a second

The date of last menstrual period :

Nature of menstrual cycle : Regular / irregular

(ii) Swelling

Duration

- Site .

Any relief on rest : Yes / No

(111) Noscoche

Autation in the second second

elte

Relieved by Analgesics : Yes / No

(iv) Did you consult any doctor before in this pregnancy

#### Yes / No

- (v) If yes to (iv), what was your B.P. at the time of the first Ante-natal visit ?
- (vi) Whether any special investigations done.
  If yes specify -
- (vii) What was your B.P. before this pregnancy -
- (viii) Total No. of issues : Alive : Dead :
- (ix) What was the B.P. after each pregnancy :
  - (x) Did you have any of the following complaints during this pregnancy.

(a) Headache : Yes / No

(b) cedens

(c) Sudden weight gain . Yes / No

(d) Blurred vision . Yes / No

(a) Restlessness . . . Yes / No.

(f) Oliguria

(g) Epigastric distress : Yes / No

(h) Nausea : Yes / No

- (1) Vomiting : Yes / No
- (j) Sudden rise in B.P. : Yes / No
- (xi) Did you have any of the above complaints in any of the previous pregnancies ?

#### Yes / No

#### (xii) Have you suffered from :

Hypertension : Yes / No
Heart disease : Yes / No
Liver disease : Yes / No
Chronic Nephritis : Yes / No

Diabetes mellitus : Yes / No

Any other diseases

(xiii) Did any of your family members suffer from any of the conditions in (xii)

Yes / No

If Yes, specify -

(xiv) Your distary habits : Vegetarian/Non-Vegetarian.

! The cooking media you use 
The amount of Est You consume -

Is this amount Some / Nore / Less than that consumed previous to this pregnancy ?

- (xv) Did you breast feed your child : Yes / No
- (xvi) If No, the (xv) then this was : Voluntarily/
  Due to no milk
  formation.
- (xvii) The amount of fat consumed after this delivery -
- (xviii) General Examination -
  - (xix) Per abdominal Examination -
  - (xx) Per vaginal Examination -
  - (xxi) Investigations -

\*\*\*\*

# Observed values of serum total cholesterol

In conditions of normal pregnancy

	Nome of the patient	Anth to Afth week of pregnagacy	37th to 40th Veek of Pregnancy	Just before delivery	Ist day of delivery	7th day of delivery	6-8 weeks after delivery
1.	Manju	300	260	268	195	169	350
2.	Kesex	165	210	188	255	182	156
3.	Sulekha	290		234	253	200	266
4.	Numtes	300	315	320	252	351	
5.	Chaya	250	290	240	242		200
6.	Mithia	300	306		375	275	500
7.	Vidhya	300	340	314	200	200	195
£ .	Kiran Juri	368		357	299 .	351	325
9.	Swikelti.	265	*	260	208		168
10.	Neelan	300	335		•		
11.	Dev Kumeri	260		260	208		150
12.	Gayatri	280	286	280	500	at the second se	•
13.	Maya	240	250	228	210	195	156
14.	Dhagwat1	180	135		•	166	150
5.	Vijaya	200	189	325	166	299	200
16.	Mithlesh	300	351	325	300	· \ •	238
7.	Meelam	270	300	280	265	271	243
8.	Seema	200	224	•			149
9.	Probbe wati	, 290	256	221	241		310
10.	Vidya	200	196	200	147. <b>2005</b>	160	156
1.	Rekha	360	351		2877	•	300
2.	Ram Kali	300	330	***		•	
3.	Shanti	200	230				•
4.	Mecha	165	176		•		

In conditions of pre-eclampain

s.No.	Name of the patient	28th to 36th week of pregmancy	37th to 40th week of pregumey	Just before delivery	Ist day of delivery	7th day of delivery	6-8 veeks after delivery	
1.	Shanti	200		208		156	150 (182 at 1	2 wks
2.	*radule	240		260	273	234	227	
3.	Lami	230		319	317	276	314	
4.	Usha	300	337	300	255	276	227 (247 at 1	2 wks
5.	Gu <b>d</b> di	256		189	201	247	225	
5.	Ran1	220	228		234		202	
7.	Sheela	260	230	227	229			
3.	Shakeela	306		325	•	320	330	
9.	Ram Weti	310	316	320	300			
10.	Neona	300	360	•	250	208	200	
11.	Nazma	250	269	240	244			
12.	Raj Kumeri	265	240	200	232	252	220	
13.	Meetu	369	430	100	402	360	335	
4.	Vijey Lexmi	204	189	200	220	299	162	

In conditions of eclamosia

з.иэ.	Meme of the patient	Just before delivery	Let day of delivery	7th day of delivery	6-0 weeks after delivery
1.	Ram Bal	179	205	162	170
2.	Basant Kumari	259	200	195	
3.	Lalto	188	***	150	136
٠.	Kamla		240	273	230
5.	Girja	340	300	200	261
<b>6.</b>	Sumita	817			200
7.	Manku	270		254	250
	Murt1	260	236	267	256

Blank spaces denote conditions where the value could not be estimated.

# Normal pregnamoy Persmeters of the patients during amtenatal and post-natal period.

	Name of the	.ge in	Welch't	Hely	ne	Accio-	Educational		te March (resident, 1865 pp., 1965). Analdent March 16 March (resident property and 1965). In			
	pationt	years	kor.	r.	in.	acatus	status	Gravida	ype	A <b>ntenatal</b> diet	Process at all	Laccation
	Manju	22	52	4	11	Middle	Xiddle pass	. rimi	N.V.	iilgh fat	hagh fet	Breast feed + top fee
	Kesar	24	46	5	0	Lover	Illiterate	. clui	Veg.	Usual	Usual	Sreast feed.
	Sulekha	19	50	5	3	Madile	High School	rimi	Veg.	Usual	High fat	Breast feed + cop fee
	Numtes	30	70	5	1	Upper	Graduate	Third	N.V.	Migh fat		Breast feed + top fee
*	Chaye	24	50	5	3	niddle	illigh School	Frimi	Veg.	Usual	Umial	Breast feed.
	Mithla	30	56	5	0	Middle	High School	Third	N.V.	Usual	High fat	Top feed.
*	Vidhya	24	68	5	1	Middle	Primary	rini	Veg.	High fat	Usual	Breast feed.
	Kiren suri	22	60	*	11	Upper	Intermediate	Primi	N.V.	High fet	High fat	Breast feed + top fee
•	Swikriti	20	52	5	1	Hidale	High School	Frimi	Veg.	Usual	Vaugl	Dreast feed.
0.	Neclam	24	62	5	0	Upper	Graduate	Primi	N.V.	High fat		
1 +	Dev Kumeri	30	50	5	0	Lower	Illiterate	Third	Veg.	Usual	Usual	Breest feed.
2.	Gayatri	20	55	5	2	Middle	Illiterate	reimi	Veg.	Usual		
3.	Maya	22	48	4	11	Lover	Illiterate	Frimt	Veg.	Usual	Usual	still birth.
4.	lingwell .	32	60	5	2	rower	Illiterate	Fourth	Veg.	Usual	Usual	Breast feed.
5.	Vijaya	35	63	5	3	niddle	Primary	Pourth	Veg.	Vausl	Lauel	Breast feed.
6.	Mithlesh	24	55	5	1	Middle	Intermediate	Frini	Veg.	High fat	Usual	Breast food.
7.	Noclas	22	61	5	1	Middle	Middle pass	Frint	Veg.	Usual	Usual	breast feed.
8.	Secha	32	64	4	11	Middle	Primery	Fr1m1	Veg.	Unual	Usual	Breest feed.
9.	Frabba wati	23	66	•	0	Middle	Alddle pass	Primi	M.V.	Usual	High fat	Breast feed + top fee
0.	Vidhya	32	- 58	5	0	Lower	Illiterate	Thied	Veg.	Usual	Usual	Breest feed.

Alleman Grant and Control of the Con	Name of the		eight.	heig	tet	Socio-	Educational		117 SIZ ADDI, NEET THERETON DESCRIPTION OF THE RES	Dist	Postnatal	Angtation	And the property states and a series of the property of the pr
- NO -	pationt	Assin Assin	kgs.		In.	ecompaic platus	status	Graviča	7700	ale:	diet -	A E E E E E E E E E E E E E E E E E E E	
21.	Rekha	26	58	5	1	Upper	intermediate	hird	Veg.	Hiton fat	****		
22.	Ram kali	30	57	5	1	Middle	Illiterate	Inira	Veg.	Usual	High fat	con feed.	
23.	Shanti	21	52	•	3	Middle	X111terate	Frini	Veg.	Usual	•		
24.	Meena	23	52	5	4	Lower	digh school	Frimi	Veg.	Usual			Maria I

High fatty diet - Consumption of more than 300 mg cholesters) per day.

N.V. - Non-vegetarien.

Veg. = Vegetarias.

Pre-eclements

	Name of the	age in	anight	1019	114	010-	Educational		. Market and the second second second	i piqt		
.No.	patient	years	kys.	In Ft.	in.	economic etatua	THE RESERVE OF THE PROPERTY OF	Gravida	V 20	Antenatal Glet	Postnetal Glet	The second second control of the second seco
	Chanti	19	49	4	11	Lidale	Middle pass	Frimi	M.V.	Usual	Usual	areaut fed.
	Mradula	25	66	5	0	Upper	Intermediate	Primi	Veg.	High fat	Hish Tat	Breast feed a top feed
•	Laxmi	20	48	5	0	Lower	Middle pass	Primi	Veg.	Usual	Vaual	breast feed.
•	Usha	22	62	5	2	Uppar	Latural	Primi	M.V.	High fat	Usual	Breast feed + top feed
	Libbuo	28	44	5	0	lower	Illiterate	Third	Veg.	Usual	Usual	still birth.
	&an1	22	56	5	1	Middle	Illiterate	Primi	Veg.	Usual	Usual	Still birth.
•	Sheela	20	62	5	3	Upper	Intermediate	Pourch	Veg.	Usual		
•	Shakeela	22	50	5	0	Middle	Frimary	Primi	N.V.	liigh fat	Migh fat	Breast food + top feed.
*	Kame Weti	35	60	4	11	Upper	Middle pass	Fourth	N.V.	High fat		
e.	Necks	26	51	5	1	Upper	Intermediate	Primi	Veg.	High fat	Usuel	Breast feed.
1.	Nazma	23	58	5	2	Middle	Illiterate	Fourth	N.V.	Usual	•	
2.	Raj Kumari	<b>3</b> 8	60	5	2	Middle	Illiterate	Thin	Veg.	Usual	Uswal	Breast feed.
3.	Neetu	30	60	5	1	Upper	Graduate	Primi	N.V.	High fat	Usual	Top Seed.
4.	Vijay Laxmi	31	66	5	0	Lower	Middle pass	Third	Veg.	Usual	Usual	Breast food.

High fatty diet - Consumption of more than 300 mgs chalesterol per day.

N.V. - Non-Vegetarian,

Veg. - Vegeterien.

### Eclements

	Kame of the	Age in	*eight	Hois		ocio-	Mucational		Harris Branch Street	Diet	er de Britis en dischipitation authorise en salan	Lactation
.No.		years	kgs.	Pt.	In.	economic status	atatus	Gravide	Туре	Antenatal dist	dist	And THE SECTION AND THE SECTION ASSESSMENT
	ham Bei	24	50	5	3	Lower	Illiterate	Primi	Veg.	Usual	Usuel	Breast feed.
•	Besent Kumeri	22	60	5	1	Lower	Illiterate	Frint	Veg.	Usual	•	
•	Lelto	35	70	5	0	LOVET	Illiterate	elxth	Veg.	Usual	Usual	Preast feed.
	Kamla	19	45	4	11	Lover	Illiterate	i <b>rimi</b>	Veg.	Dany	Usual	Still birth.
	Girja	20	45	5	0	Middle	Frimary	Primi	Veg.	High fat	High for	Still birth.
	Sunita	22	62	5	3	LOver	Middle pass	Primi	M.V.	Veuel	Usual	Breast feed.
•	Manky	20	62	5	2	Middle	Illiterate	Primi	N.V.	High fat	High fat	Breast feed.
	Murt1	24	50	5	0	Hiddle	Middle pass	Primi	Veg.	Usual	High fat	still birth.

Blank spaces denote conditions where the parameters could not be wort out.

High fatty diet = Consumption of more than 300 mg cholesters) per day.

N.V. = Non-vegetarian,

Veg. - Vegetarian.